BT5 / J03 **S-7201**

ECE-321 : Digital Electronic Circuits and Systems

Time : 3 Hrs. M.M. : 100

1. (a) Assuming that a constant value 1 is available show that $f(A, B) = \bar{A}B$ (together with the constant) is a universal operation. (6)

   (b) Prove that if $\bar{w}x + y\bar{z} = 0$ then

   $$wx + \bar{y}(\bar{w} + \bar{z}) = wx + xz + \bar{x}\bar{z} + \bar{w}\bar{y}z. \quad (6)$$

   (c) Use Q.M. method to simplify function $f(w_1 x_1 y_1 z) = \Sigma(4, 5, 8, 12, 13, 14, 15)$. (8)

2. (a) For the high threshold logic NAND gate of the circuit shown if v_z of the diode is 6·9 V verify that this circuit functions as a positive NAND and calculate $h_{FE\ min}$. (4)

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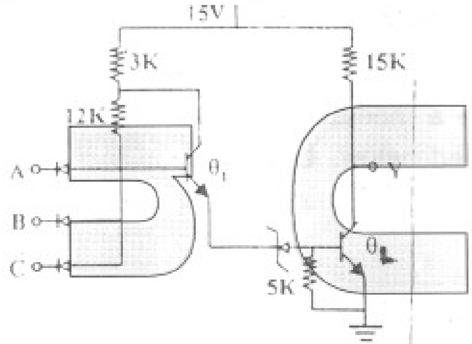
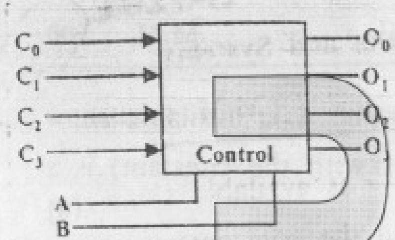


   (b) Calculate the noise margins. (8)

   (c) Calculate the fanout of this gate if $h_{FE\ min} = 40$. (8)

3. (a) Design a 40 : 1 multiplexer using 8 : 1 multiplexers. (10)

(b) Design a four bit nibble control system that performs the bit manipulation defined in the control table. (10)



A	B	O_3	O_2	O_1	O_0
0	0	0	0	0	0
0	1	1	1	1	1
1	0	$\overline{C_3}$	$\overline{C_2}$	$\overline{C_1}$	$\overline{C_0}$
1	1	C_3	C_2	[illegible]	[illegible]

4. (a) Define Race. Explain the differen and non-critical race.

(b) A two input (x sequentia following Whenever x while $x_1 = 1$ remains 1 un.

5. (a) Differentiate b

(b) Design a modulo specified below. U

Decimal	(
0	0
1	0 0
2	0 1
3	0 1 0
4	1 1 0
5	1 1 1
6	1 0 1
7	1 0 0

(14)

Design a synchronous decade (8)

(b) Reduce the state table given below :

PS	$x = 0$	$x = 1$
	NS, z	
	A, –	C, 1
	B, –	A, –
	G, –	E, 0
	C, 1	C, –
	A, 1	C, –
	D, –	A, –
	G, –	G, –
	H, –	D, –

(12)

short notes on any two : (10+10)

Pulse mode circuit. (b) Symmetric network.

) Parity checker & parity generator.

(a) For the following function, specify the don't care conditions and determine the function F and ϕ so that it is disjunctively decomposable as follows :

$$f(v, w, x, y, z) = \Sigma (1, 2, 7, 9, 10, 17, 19, 26, 31) + \Sigma_q (0, 15, 20, 23, 25)$$

$$= F[\phi (v, w, y), x, z]$$ (10)

(b) Determine the function $f(x_1, x_2, x_3, x_4)$ realized by the network shown in fig. (10)